

**CLAIMS**

1. A multi-mode radio module (22) comprising a terminal (11) for connection to signal propagating and receiving means (10), a transmitting  
5 branch (DCS/PCS) coupled to the terminal, and a branching circuit coupled to the terminal, the branching circuit comprising at least a first and a second branch for receiving signals in first and second frequency bands (DCS/PCS), respectively, each of the first and second branches comprising, respectively, a phase shifting circuit (PS1/PS2), a band pass filter (RXF2,RXF3) coupled to  
10 the phase shifting circuit, the bandwidth of the filter being selected to pass a wanted signal in one of the first and second frequency bands but reject an unwanted signal in the other of the second and first frequency bands, and a low noise amplifier (LNA2,LNA3) coupled to an output of the band pass filter (RXF2,RXF3), wherein each of the phase shifting circuits (PS1,PS2) is  
15 impedance transforming.

2. A radio module as claimed in claim 1, characterised in that each of the band pass filters (RXF2,RXF3) is a BAW filter.

20 3. A radio module as claimed in claim 1, characterised in that each of the band pass filters (RXF2,RFX3) is a SAW filter.

4. A radio module (22) as claimed in claim 1, 2 or 3, characterised in that each of the phase shifting circuit, (PS1,PS2) comprises a series  
25 capacitance and a shunt inductance, the values of the series capacitance and the shunt inductance being such as to provide a predetermined impedance transformation between that of the signal propagating and receiving means and the respective band pass filter (RXF2,RXF3).

30 5. A radio module as claimed in any one of claims 1 to 4, characterised in that the branching circuit is coupled to the terminal by way of a length of transmission line (TXL2).

6. A radio module as claimed in claim 5, characterised by the transmitting branch (DCS,PCS) having a series switch (SW3) coupled to the terminal (11) and the branching circuit having a shunt switch (SW5) coupled to  
5 an end of the transmission line (TXL2) remote from the terminal.

7. A radio module as claimed in any one of claims 1 to 6, characterised in that a duplexer (12) is coupled to the terminal (11), in that the transmitting and the branching circuit are coupled to a port of the duplexer for  
10 passing signals having frequencies lying in a first bandwidth and in that a further port is coupled to a further branch for processing signals having frequencies lying in a second bandwidth.

8. A multi-mode radio comprising signal propagating and receiving  
15 means (10), means for modulating signals to be transmitted, means for demodulating received signals and a multi-mode radio module (22) comprising a transmitting branch (DCS/PCS) coupled to the signal propagating and receiving means, the modulating means being coupled to a signal input of the transmitting branch, and a branching circuit coupled to the signal propagating  
20 and receiving means, the branching circuit comprising at least a first and a second branch for receiving signals in first and second frequency bands, respectively, each of the first and second branches comprising, respectively, a phase shifting circuit (PS1,PS2), a band pass filter (RXF2,RFX3) coupled to the phase shifting circuit, the bandwidth of the filter being selected to pass a  
25 wanted signal in one of the first and second frequency bands but reject an unwanted signal in the other of the second and first frequency bands, and a low noise amplifier (LNA2,LNA3) coupled to an output of the band pass filter, the respective low noise amplifiers being coupled to the demodulating means, wherein each of the phase shifting circuits (PS1,PS2) is impedance  
30 transforming.

9. A radio as claimed in claim 8, characterised in that each of the phase shifting circuits (PS1,PS2) comprises a series capacitance and a shunt inductance, the value of the series capacitor and the shunt inductance being such as to provide a predetermined impedance transformation between that of  
5 the signal propagating and receiving means and the respective band pass filter (RXF2,RXF3).

10. A radio as claimed in claim 9, characterised by the transmitting branch having a series switch (SW3) coupled to the terminal (11) and the  
10 branching circuit having a shunt switch (SW5) coupled to one end of a quarter wavelength transmission line (TXL2), the other end of the transmission line being coupled to the terminal.

11. A radio as claimed in any one of claims 8 to 10, characterised in  
15 that a duplexer (12) is coupled to the terminal, in that the transmitting and the branching circuit are coupled to a port of the duplexer for passing signals having frequencies lying in a first bandwidth and in that a further port is coupled to a further branch for processing signals having frequencies lying in a second bandwidth.